Paper No. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte WEI WILLIAM LEE, RICHARD SCOTT LIST
and CHANGMING JIN

_____

Appeal No. 2003-0270
Application 09/087,234

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ON BRIEF

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Before OWENS, WALTZ and KRATZ, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal is from the final rejection of claims 1 and 4-9. Claims 2 and 3 stand objected to as being dependent upon a rejected base claim but allowable if rewritten in independent form. The appellants state in the brief (page 2) that they do not contest the rejection of claims 1 and 7 as being anticipated by Kondo. The appeal, therefore, is dismissed as to claims 1 and 7. The examiner states in the answer (page 2) that the

rejection of claims 7-9 under 35 U.S.C. § 112, second paragraph, which was the sole rejection of claims 8 and 9, is withdrawn. Hence, the claims before us are claims 4-6.

THE INVENTION

The appellants claim a dielectric structure wherein a surface portion of a layer has collapsed pores. Claim 4 is illustrative:

4. A dielectric structure, comprising:

(a) a layer of porous dielectric with average pore diameter D;

(b) wherein the portion of said layer within a distance of 2D of a surface of said layer has collapsed pores.

THE REFERENCES

Gnade et al. (Gnade)	5,561,318	Oct. 1, 1996
Kondo et al. (Kondo)	5,635,301	Jun. 3, 1997

THE REJECTIONS

The claims stand rejected under 35 U.S.C. § 102(e) as follows: claim 4 over Kondo, and claims 4-6 over Gnade.

OPINION

We affirm the aforementioned rejections.

The appellants state that the claims stand or fall together (brief, page 2). We therefore limit our discussion to one claim to which each rejection applies, i.e., claim 4, which is the sole

independent claim. *See In re Ochiai*, 71 F.3d 1565, 1566 n.2, 37 USPQ2d 1127, 1129 n.2 (Fed. Cir. 1995); 37 CFR § 1.192(c)(7)(1997).

Claim interpretation

During patent prosecution, claims are to be given their broadest reasonable interpretation consistent with the specification, as the claim language would have been read by one of ordinary skill in the art in view of the specification and prior art. *See In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). It is proper to use the specification to interpret what the appellants mean by a word or phrase in the claim. *See In re Morris*, 127 F.3d 1048, 1053-56, 44 USPQ2d 1023, 1027-30 (Fed. Cir. 1997).

As acknowledged by the appellants (brief filed October 30, 2000, paper no. 10, page 3),[1] the portion of the appellants' specification which indicates the meaning of "collapsed pores" in the appellants' claim 4 is the last two paragraphs on page 13 and Figure 6. These paragraphs of the specification are as follows:

> An alternative xerogel surface enhancement collapses a thin layer of the xerogel at the surface to form a relatively continuous shell; the shell provides

[1] Elsewhere in this opinion the brief cited is that filed on February 11, 2002 (paper no. 15).

> a large contact area for deposited layers. See Figure 6 illustrating the continuous surface of the shell with collapsed pores near the surface. To form the shell, exposes [sic] the xerogel surface to ion beam bombardment. Typically, an ion implanter using an argon ion beam with a dose of $10^{16}/cm^2$ and an ion energy of 20 keV; alternatively, an argon plasma could provide the ion bombardment. The hard shell will be about 20-50 nm thick. The hard shell provides good surface adhesion for plasma-enhanced deposited oxide.
>
> In effect, if the average pore diameter were D, then the portion of the xerogel within a distance of 2D of the surface would have a porosity (ratio of total pore volume to total volume) of much less than half of the porosity away from the surface.

The first paragraph discloses that the collapsed pores can be formed by exposing the surface to an ion beam, and figure 6 shows that the collapsed pores can have the same shape as the underlying pores but are smaller. The second paragraph discloses that the porosity at a distance within 2D of the surface is much less than half the porosity away from the surface. Hence, the broadest reasonable interpretation of "collapsed pores" in claim 4 in view of the specification is: pores within a distance 2D of the surface which are smaller than pores farther from the surface such that the layer containing those smaller pores has a porosity which is less than about half the porosity at any chosen distance away from the surface.

Rejection over Kondo

Kondo discloses a dielectric structure (col. 1, lines 9-11) having a 15 µm thick dense layer (1b) above a 250 µm thick porous layer (col. 5, lines 3-7). The layers are bonded together with a non-deteriorating bond formed by heat treating and sintering (col. 3, lines 6-7; col. 4, line 55 - col. 5, line 2). The porous layer is formed from a slurry containing carbon powder which oxidizes out of the material to form pores which are closed by sintering (col. 3, lines 46 and 56-63; col. 4, lines 12-15). The slurry used to form the dense layer differs from that used to form the porous layer only in that it does not contain carbon (col. 4, lines 43-45). The porosities of the dense layer and the multilayer substrate are, respectively, 1% and 60% (col. 5, lines 14-17). Thus, Kondo indicates that the pores in the dense layer, formed in the absence of carbon powder, are much smaller than the pores in the porous layer. This indication that the pores in the dense layer are much smaller than those in the porous layer, together with the teachings that the multilayer substrate's average pore size is 10 µm or less, more preferably 3 µm or less (col. 2, line 64 - col. 3, line 3), the thickness of the dense layer is 15 µm (col. 5, line 7), and the porous layer is 16.7 times thicker than the dense layer (col. 5,

lines 6-7), indicate that the dense layer contains small pores within a distance of 2D of the multilayer substrate surface, where D is the average pore diameter of the multilayer substrate.

The appellants argue that "[t]here is no suggestion in Kondo for any processing step to collapse any pores; rather the low porosity sublayer [1b] is directly formed with low porosity" (brief, page 3). The appellants, however, are claiming an article, not a method for making it. Hence, the relevant question is whether Kondo's article is the same or substantially the same as the appellants' article formed using the implied product-by-process step of collapsing pores. *See In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985); *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977). As discussed above, the appellants' specification indicates that the term "collapsed pores" encompasses pores which are smaller than those farther from the surface such that the porosity of the collapsed pore-containing material is less than about half that of the material at some chosen distance away from the surface. Kondo's disclosures that the relative densities of the dense and porous layers are, respectively, 1% and 63.5%[2], and that the only

[2] (X x 250 + 0.01 x 15)/265 = 0.6; X = 0.635.

difference between the layers, other than their thicknesses, is that the dense layer is formed from a slurry which does not contain carbon which burns out to form pores which are closed by sintering (col. 3, lines 56-63; col. 4, lines 12-15 and 43-45), indicate that the dense layer contains pores which are smaller than pores in the porous layer and that the porosity of the dense layer is less than about half that of the porous layer.

Hence, it reasonably appears that Kondo's dielectric structure is the same or substantially the same as that claimed in the appellants' claim 4. Consequently, the burden has shifted to the appellants to show a patentable distinction between the dielectric structures of the appellants and Kondo, *see Fitzgerald*, 619 F.2d at 70, 205 USPQ at 596; *Best*, 562 F.2d at 1255, 195 USPQ at 433-34, and the appellants have not carried that burden. Accordingly, we affirm the rejection over Kondo.

Rejection over Gnade

Gnade discloses a dielectric structure (col. 1, lines 34-35) having a densified porous sublayer (29) with 20% porosity over an undensified porous sublayer (28) with a porosity greater than 75% (col. 7, lines 15-20). The average pore diameter of the dielectric structure preferably is less than 80 nm, more preferably between 2 nm and 25 nm (col. 3, lines 59-62). The

undensified porous sublayer is relatively porous because its shrinkage during drying is controlled by use of a surface modification step, whereas the shrinkage of the densified porous sublayer is not controlled (col. 7, lines 1-18). The teaching that the densified porous sublayer is densified by shrinking during drying indicates that the pores of this shrunken layer are smaller than those of the undensified porous layer. The illustration of the dielectric structure (figure 2), and the disclosure that the densified porous sublayer can extend far enough above conductors (24) to serve as an interlayer dielectric (col. 7, lines 20-22), indicate that the small pores in the densified porous sublayer extend a distance of at least 2D from the dielectric structure surface, where D is the average pore diameter of the dielectric structure. Also, the 20% porosity of the densified porous sublayer is less than about half the porosity of the undensified porous sublayer, which is greater than 75%. Gnade's dielectric structure, therefore, reasonably appears to fall within the scope of the appellants' claim 4.

The appellants argue that Gnade teaches (col. 3, lines 59-62) that the pores have a preferred pore size without regard to the porosity and that the porosity relates to the number of pores and not the pore size (brief, page 3). Gnade's disclosed average

pore size is that of the dielectric structure (col. 3, lines 59-62). However, the teaching that the densified porous sublayer, but not the undensified porous sublayer, shrinks during drying (col. 7, lines 1-20), indicates that the pores of the densified porous sublayer are smaller than those of the undensified porous sublayer.

The appellants argue that "there is no suggestion in Gnade for any processing step to collapse any pores; rather the low porosity sublayer [29] is directly formed with low porosity" (brief, page 3). This argument is not persuasive because, as discussed above regarding the rejection over Kondo, the appellants are claiming an article and not a method for making it. As discussed above, it reasonably appears that Gnade's article falls within the scope of claim 4. The appellants, therefore, have the burden of showing a patentable distinction between their claimed article and that of Gnade, *see Fitzgerald*, 619 F.2d at 70, 205 USPQ at 596; *Best*, 562 F.2d at 1255, 195 USPQ at 433-34, and the appellants have not done so.

For the above reasons we affirm the rejection over Gnade.

DECISION

The rejections under 35 U.S.C. § 102(e) of claim 4 over Kondo and claims 4-6 over Gnade are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

TERRY J. OWENS Administrative Patent Judge	)	
THOMAS A. WALTZ Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
PETER F. KRATZ Administrative Patent Judge	)	

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Texas Instruments Incorporated
P.O. Box 655474, M/S 3999
Dallas, TX 75265